Targeting Traffic Problems Through and Automated Collision Database

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Project Description

Over a typical three-year period, the Metropolitan Nashville Police Department logs and analyzes more than 90,000 traffic collisions within Davidson County. The analysis of this data by both the public works and police departments is labor-intensive because data analysis is performed by hand from paper printouts of reports that are stored electronically in the police department's mainframe computer. Like many jurisdictions, information delivered to the traffic engineering staff for analysis is also in the form of monthly paper printouts, plus hard copies of the actual collision report forms. Because of the cumbersome nature of such analysis, the paper process severely limits the ability to analyze information at high-incidence intersections to determine the cause or nature of collisions and to propose corrective engineering or enforcement solutions, and trend analysis is almost nonexistent.

Another important point is that the two departments, police and public works, look for different causality effects regarding traffic crashes. Police are more focused on enforcement issues, while public works personnel pay more attention to engineering and signal or sign placement. In an attempt to improve the current system, Metro officials undertook a project to make collision reporting more efficient and the analysis more timely.

The project consisted of three major tasks:

1. Development of an electronic data-entry application for real-time entry of collision reports in the field by officers in the police cruisers;

2. Development of an automated database system for analysis of collision data collected in the field at the time of the crash; and

3. Analysis of historical collision data to determine the 30 highest collision locations within Nashville and Davidson County for more detailed engineering analysis.

The purpose of the project was to generate custom software applications to replace the current paper-based method of both collision reporting and collision analysis. The implementation of this system will make possible the near real-time entry and analysis of collision records. In addition to the increase in time efficiency, the overall level of analytical capability will be greatly improved by allowing for enhanced manipulation of collision data. The records themselves will achieve a higher level of accuracy by eliminating many of the data-entry steps, therefore, eliminating opportunities for error. Specifically, the system will allow for electronic capture and data entry of collision information contained on the collision report and allow geospatial (or GIS, which stands for geographic information system) analysis of collision data within metropolitan Davidson County.

To simplify the process, Metro Nashville Police and Public Works worked with the Tennessee

Governor's Highway Safety Office to retain Neel-Schaffer, Inc., an engineering and planning firm to develop a custom software solution for automated collision database reporting. The resulting software was named CollisionView™ and enables police to log reports into computers with the data becoming readily accessible to traffic engineers and police planners within Metro Government using.

Metro officials say that the new system allows them to be more proactive in reviewing and addressing the problems of the city's intersections. Even more important, they can perform that analysis much more quickly than before. Jonathan Cleghon, an engineer with Metro Nashville who worked on the project summed the improvements up this way. "If you've got a major intersection with 50 accidents a year, under our old system you would sit down and review 150 accidents over a three-year period from police printouts, and you'd spend a day or more going through filing cabinets. With the collision database, and the CollisionView™ software that was developed for us, if you wanted to know how many of those 150 accidents were the result of drunk driving, you could get the answer in five minutes or less."

Project Discussion

Using GIS to target traffic problems illustrates a best practice to adopt for traffic crash data systems. The analytical module allows traffic analysts (police and public works) to simply point to an intersection on the GIS map and retrieve all crashes from the three-year period in the database. The data can then be filtered by day of he week, time of day, type of crash, weather conditions, number of cars, driver impairment, etc., for further analysis.

A few examples of this type of analysis now available is:

- What happens to the number of crashes at an intersection during the day?

- Do they peak in the morning rush hour or the evening rush hour?

- Did the presence of an officer near the intersection for three days during evening rush-hour traffic makes crashes go down? How long did this positive impact last?

- At what intersections do police officers need to be available during rush hour for traffic control?

- What is the best placement of manpower to work accidents throughout the day?

Another advantage of an electronic GIS environment is the ability to analyze crashes that occurred at intersections along a corridor or within a district or around a special event such as a football game.

After deployment of the new software, Neel-Schaffer found that the time required to assess the safety of city intersections dropped significantly following the installation of the program. For example:

- The time required to assess an average intersection dropped from 30 minutes to five minutes.

- Assessing a major intersection, which took eight to 10 hours before, likewise dropped to about five minutes.

- Assessing traffic corridors was reduced from a task that took days or weeks to a 15 to 20 minute effort.

- Assessing large traffic grids - impossible under the old system - can be accomplished in 15 to 20 minutes.

A review of accident reports for the last three years revealed the following:

- The same intersections will likely always be the top 10 most dangerous, due mainly to the large volumes of traffic moving through them.

- In many cases repeat accidents could be avoided through the simple addition of a curbside signal to augment overhead signals.

- Out of 88,500 accidents reviewed, few resulted in fatalities. Most of the accidents occurred at busy intersections where speed was not a defining factor.

- Of the multiple-fatality accidents reported, few shared common patterns other than speed.

- Comparatively few accidents were weather related.

- The greatest number of accidents tended to be where downtown arteries intersect with loop highways and near shopping malls.

- Drunk-driving accidents occurred most frequently in the early morning hours of Saturdays in the vicinity of downtown bars and typically involved head-on collisions or single-car accidents.

BIOGRAPHICAL SKETCH

Mr. Thompson joined Neel-Schaffer in 1988, after services as one of the companies vice presidents in charge of information technology where he has managed various GIS projects, ranging from small sign inventory databases to multi-million dollar custom software development projects. Three years ago, he made a concerted effort to integrate GIS technology into traffic and transportation related work performed by the firm, and the project highlighted at this conference is the culmination of that effort.

Mr. Thompson is a sought-after teacher and instructor for GIS and has applied GIS technology to the following areas related to traffic safety:

- Data Analysis and Traffic Safety;

- Traffic Crash Data Systems;

- Roadway Information Systems;

- Traffic Data Systems;

- Congestion Management; and

- Strategic Planning.

He currently serves as the principal-in-charge of deploying automated collision databases in Memphis, Nashville, Knoxville, Chattanooga, Clarksville, Johnson City, Jackson and Mufreesboro.